Oct. 20, 1953 D. P. GROVER 2,655,674

MULTIPLE ROTARY TOOTHBRUSH WITH LIP GUARD

Filed Sept. 30, 1946 2 Sheets-Sheet 1

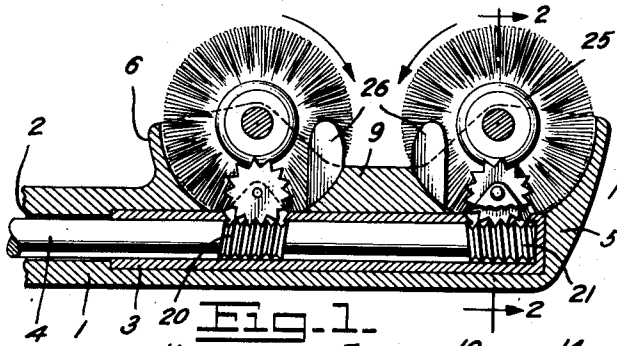


Fig. 1.

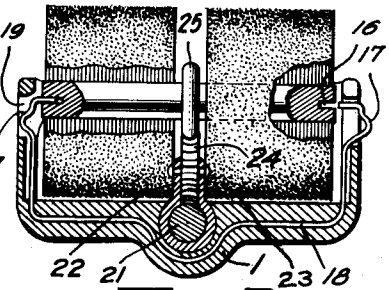


Fig. 2.

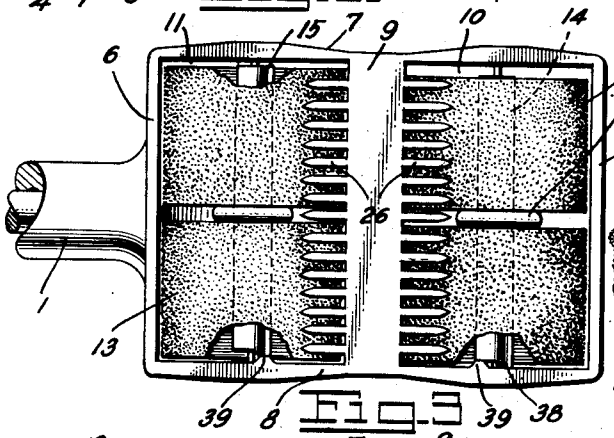


Fig. 3.

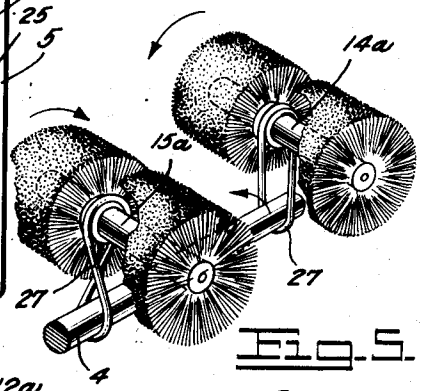


Fig. 5.

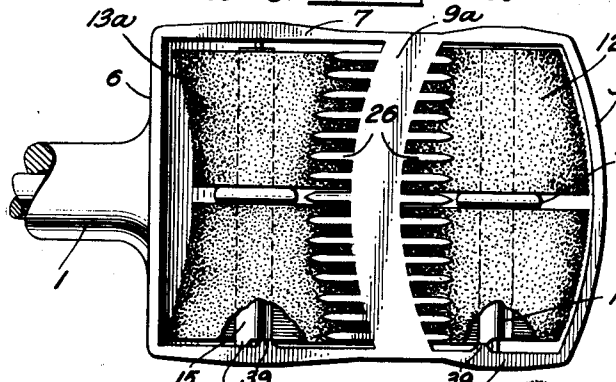


Fig. 4.

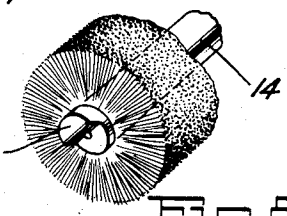
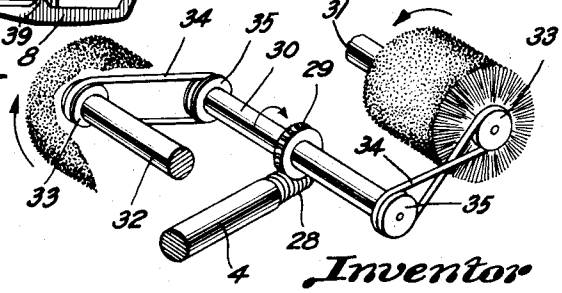


Fig. 6.



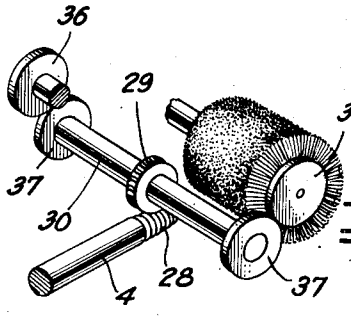


Fig. 7.

Inventor
Donald P. Grover

By: Spencer, Johnston, Cook & Root
ATTYS.

Oct. 20, 1953 D. P. GROVER 2,655,674

MULTIPLE ROTARY TOOTHBRUSH WITH LIP GUARD

Filed Sept. 30, 1946 2 Sheets-Sheet 2

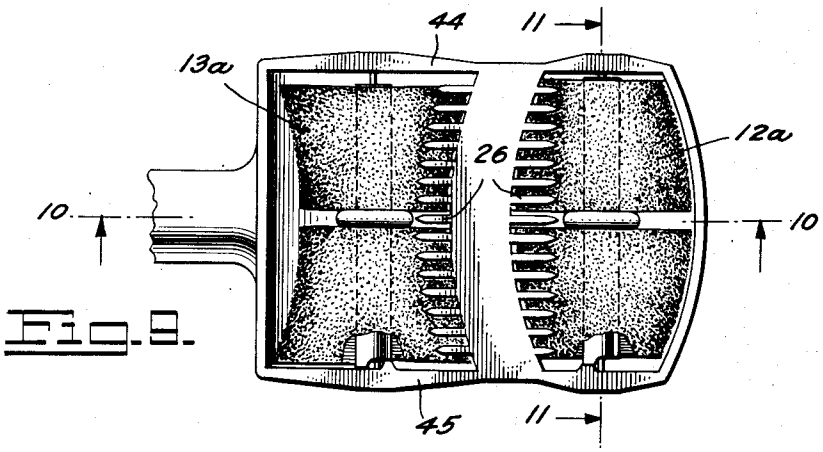


Fig. 9.

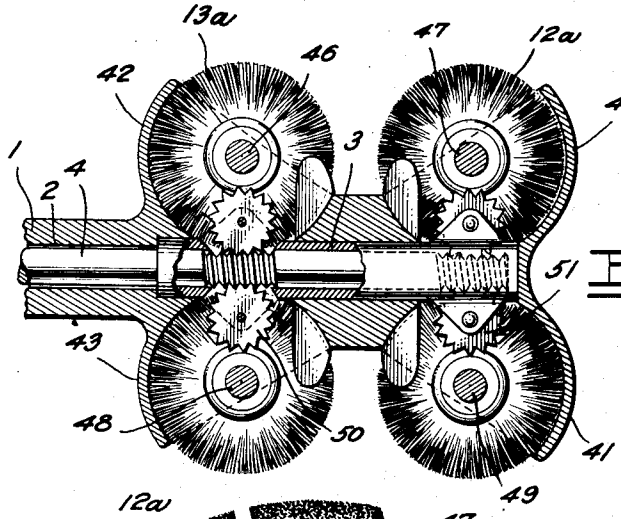


Fig. 10.

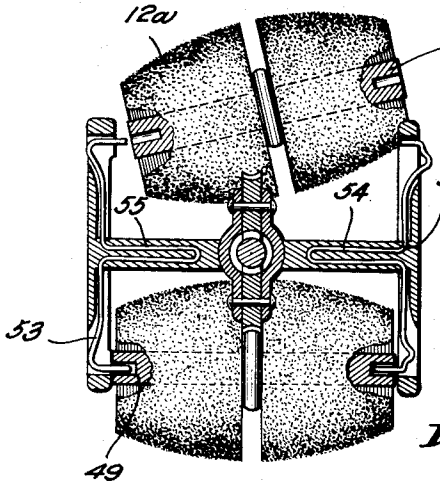


Fig. 11.

Inventor
Donald P. Grover

By: Spencer, Johnston, Cook & Root.
ATTY'S

Patented Oct. 20, 1953

2,655,674

UNITED STATES PATENT OFFICE

2,655,674

MULTIPLE ROTARY TOOTHBRUSH WITH LIP GUARD

Donald P. Grover, Chicago, Ill.

Application September 30, 1946, Serial No. 700,315

7 Claims. (Cl. 15—23)

1

This invention relates in general to rotary toothbrushes and in particular to a type of rotary toothbrush adapted for personal use, as distinguished from those commonly used by dentists.

Various forms of rotary or mechanical toothbrushes have been developed heretofore, but have found very little favor with the public in general. One of the disadvantages of the early type of rotary toothbrush was the absence of any shield partially surrounding the brush element, thus causing some of the toothpaste on the brush to be thrown off and splattered about during the rotation of the brush and permitting the brush to contact the soft inner portions of the mouth causing irritation thereof.

A later development introduced a shield which extended lengthwise of and partially surrounded the rotating brush element to prevent such splattering and mouth irritation. However, actual usage of this type of brush proved unsatisfactory because of the tendency of the lip of the user to be drawn inwardly by the bristles of the brush and between the bristles and the edge of the shield when the brush was placed against the teeth, causing laceration and irritation.

All of these earlier toothbrushes contained but a single brush element and since it is considered as important by dentists that the proper way to brush teeth is away from the gums, it has been necessary to provide some reversing mechanism in order to reverse the direction of rotation of the single brush element when cleaning upper and lower teeth. The terminology referring to cleaning or brushing the teeth away from the gums, as used herein, is intended to convey the meaning that the brushing begins on or close to the gums and moves away from the gums toward the biting surface of the teeth.

I have been able to overcome the disadvantages of these earlier types of rotary toothbrushes in my present invention, the principal object of which is to provide an electrically driven rotary toothbrush having a plurality of brush elements whereby the teeth of a user may be placed therebetween and thus simultaneously brush and clean the front and back sides thereof.

Another object of the invention is to provide a rotary toothbrush wherein at least two brush elements are provided to receive the teeth of a user therebetween and to rotate these brush elements toward each other in opposite directions to insure simultaneous cleaning of the front and rear sides of the teeth away from the gums.

A further and more specific object of the invention is to provide a rotary toothbrush having a pair of brush elements one of which has a surface of convex configuration and the other

2

of which has a surface of concave configuration whereby the space between the brush elements is curved similar to the curvature of the upper and lower rows of teeth.

Still another object is to provide a rotary toothbrush having a plurality of rotatable brush elements wherein novel lip guards are located adjacent to one or both sides of each brush element to prevent the lip of a user from being drawn inwardly against the bristles of the brush.

A still further object is to provide novel driving means for simultaneously driving the brush elements in opposite directions.

Still another object is to provide a rotary toothbrush wherein, if desired, one or more of the brush elements thereof may be adapted to reciprocate longitudinally during the rotation thereof.

A still further and more specific object of the invention is to provide a rotary toothbrush having two pairs of brush elements mounted for simultaneous or alternate or intermittent rotation whereby the upper and lower teeth of a user may be simultaneously cleaned.

Other objects and advantages of the invention will become apparent upon a reading of the following description taken in connection with the accompanying drawings in which:

Fig. 1 is a fragmentary longitudinal vertical section through the shank or head portion of one form of the invention;

Fig. 2 is a vertical transverse section taken substantially along the plane of line 2—2 of Fig. 1 with one of the brush supporting parts in inoperative position;

Fig. 3 is a fragmentary plan view of the invention as shown in Fig. 1;

Fig. 4 is a plan view similar to Fig. 3 but showing a modified form of the brush elements;

Fig. 5 is a fragmentary perspective view of a modified form of driving means for the brush elements;

Fig. 6 is a view similar to Fig. 5 but showing a further modification of the brush driving means;

Fig. 7 is a view similar to Fig. 6 showing a still further modified form of driving means;

Fig. 8 is a fragmentary perspective view of one end of a brush element showing the manner in which the longitudinal reciprocation thereof is obtained;

Fig. 9 is a fragmentary plan view similar to Fig. 4 wherein two pairs of brush elements are used;

Fig. 10 is a longitudinal vertical section taken substantially along the plane of line 10—10 of Fig. 9; and

Fig. 11 is a vertical transverse section taken substantially along the plane of line 11—11 of

Fig. 9 with one of the brush elements partly removed.

Briefly described, the invention herein consists primarily of an improvement over rotary toothbrushes heretofore known in the provision of a plurality of brush elements mounted for simultaneous, alternate, or intermittent rotation to thereby clean both the front and rear sides of the teeth of a user at the same time. While the brush elements of the present invention are illustrated as extending at substantially right angles to the handle or shank of the toothbrush, it will be evident that they may be parallel to the handle portion, as shown, for example, in my co-pending application filed October 10, 1946, and bearing Serial No. 702,535, or they may be disposed at any other angle found to be convenient. The handle portion is provided in such form so that a rotatable shaft can be mounted therein. In this form of the invention the brush elements extend transversely of the driving shaft and are provided with any suitable mechanism for being driven simultaneously.

I also provide a form of lip guard to be located longitudinally, spirally or transversely of each of the brush elements. The lip guard may take any one of numerous forms such as those disclosed, for example, in my co-pending applications: Ser. No. 691,273, filed August 17, 1946; Ser. No. 691,979, filed August 21, 1946; and Ser. No. 692,270, filed August 22, 1946, all issued December 5, 1950, as patents numbered 2,533,106; 2,533,107; 2,533,108, respectively.

Referring now more particularly to the drawings and especially to that form of the invention shown in Figs. 1, 2 and 3, the handle portion 1 may assume any desired form, but should be of a size which may be conveniently held in the hand and should also be formed of a plastic or other similar non-conducting material. The handle portion or shank 1 illustrated in Fig. 1 has an elongated opening 2 therethrough adapted to receive an elongated bearing member 3 to rotatably support the drive shaft 4. The means for driving the shaft 4 is not important to the functioning of the device as far as the present invention is concerned and such driving means may include an electric motor embodied as a part of the handle portion or the shaft may be driven from an external source by means of a flexible shaft. It is necessary, however, that some suitable driving means be provided for rotating the shaft 4 and thus driving the brush elements simultaneously as hereinafter pointed out.

The shank 1 may be integral with that part of the handle actually grasped by the user, in which event the term "handle portion" will include the part illustrated in the various figures. On the other hand, if the shank 1 is detachable from the actual handle portion, as it may easily be, then the term "handle portion" as used herein, is intended to include such shank.

The handle portion terminates at its outer end in an up-turned portion 5 extending transversely of the main portion of the handle which is gripped by the hand of a user, and has spaced therefrom and parallel thereto a similar up-turned portion 6 to thereby form a shield. The front and rear up-turned portions 5 and 6 are connected by sides 7 and 8, and a central transversely extending partition 9 divides the end of the handle into two transversely extending receptacles 10 and 11. The receptacle 10 is adapted to receive one of the brush elements 12 while

the other receptacle 11 receives the brush element 13.

These brush elements are provided with spindles 14 and 15, each of which has an axially extending opening in each end thereof to receive the yieldable supporting ends 17 of a spring support 18. One of the supporting ends 17 is shown retracted for removal of the brush in Fig. 2. This support 18 may be secured in any desired manner to the end of the handle portion and is preferably formed of a yieldable material to facilitate the removal of the brush element for cleaning and replacement purposes. In the form shown, the support 18 is embedded in the base of the receptacles 10 and 11 and each side 7 and 8 is provided with an opening 19 adjacent each end of each brush element to enable the ends of the support 18 to be moved outwardly, thus disengaging its ends from a spindle for removing the brush element.

It will be obvious that any suitable driving means between the shaft 4 and the spindles 14 and 15 of the brush elements may be utilized to rotate the brush elements simultaneously. One form which such driving means may take is to provide threaded or worm sections 20 and 21 in the shaft 4. At the location of each worm section, the bearing 3 may be provided with upwardly extending spaced supports 22 between which a worm gear 23 may be rotatably mounted on a pin or shaft 24. The worm gear 23 in each case will be in mesh with its corresponding worm section on the shaft 4 at one side thereof and will be in contact with a suitable gear or other form of wheel 25 located centrally of each spindle so that a rotation of the shaft 4 will drive the worm gears 23 and the brush elements 12 and 13 through contact with the gear or wheel 25. It will be evident that if it is desired to rotate the brush elements simultaneously in opposite directions, the threads of the worm sections 20 and 21 may be extended in opposite directions as shown. If it is desired to drive the brush elements in the same direction, then these worm sections may be made accordingly.

As explained in my above referred to co-pending applications, it is highly desirable for the comfort of the user during cleaning of the teeth that lip guards be provided to prevent the lip from being drawn inwardly by the bristles of the brush between the brush element and the shield causing irritation and lacerations. These lip guards may take any one of a number of forms and for purposes of illustration I have shown the central dividing partition 9 as being provided with upwardly and inwardly extending teeth 26 along each edge thereof. It is, of course, necessary that these lip guards be located along the edge of the brush element which moves downwardly as the device is positioned for cleaning the upper teeth. Thus, when the brushes are adapted to rotate in opposite directions toward each other as shown in Fig. 1, the proper position of the lip guards 26 will be as shown in Fig. 3. If for any reason, however, it is desired to rotate the brush elements in the same direction, then one of the lip guards may be placed on the opposite side of the brush from that shown in Fig. 3.

It will be obvious that when two similar brush elements are located and rotated in the manner shown and described above, it will be an easy matter for the user to place the end of the toothbrush within the mouth so that the teeth will be received between the brush elements. When the brushes are then rotated toward each other, simultaneous cleaning of the front and back of

the teeth will take place and the brushing will be in accordance with the best practices recommended by dentists, which is away from the gums. The invention thus not only saves time, but obviates any necessity for a reversing mechanism to reverse the rotation of the brushes. The brush elements can be rotated at all times in the same direction opposite each other without reversing to obtain a proper cleaning of the teeth. This is likewise true when the device is inverted for cleaning the lower teeth, wherein the rotation of the brush elements will be such as to brush the teeth away from the gums.

Fig. 4 shows a modified form of the shape of the brush elements. In this form, the construction of all of the elements are identical with those described above with the exception that the dividing partition 9*a* is curved instead of extending in a straight line between the sides 7 and 8. The curvature of this partition will be substantially the same as the space between the two brush elements which receives the teeth of a user for cleaning. Such a space is provided by forming the surface of one of the brush elements 13*a* as concave and the surface of the other brush element 12*a* as convex. The lip guards 26 may be the same or any other desired form, but may be curved in accordance with the curvature of the surface of the brush elements. This form of the invention is advantageous in that the bristles of the brush elements may contact a greater tooth surface when held in one position than may be had when the space is straight like that shown in Fig. 3.

Figs. 5, 6 and 7 disclose modified forms of driving means between the shaft and brush elements. In Fig. 5 the worm sections have been omitted from the shaft 4, and the spindles 14*a* and 15*a* are provided with centrally located annular grooves which are adapted to receive a driving belt or band 27. By placing a proper twist to the belts 27, the spindles may be driven in opposite directions as shown in Fig. 5, or if desired, they may be easily placed to drive the brushes in the same direction.

In the form shown in Fig. 6, the shaft 4 is provided with a single worm section 28 adapted to be contacted by a worm gear 29 located on a suitably mounted shaft 30 between the two spindles 31 and 32. One end of each spindle is provided with a pulley or annular groove 33 adapted to receive a driving belt or band 34 which passes around a similar pulley or annular groove 35 at each end of the central spindle 30. Rotation of the shaft 4 will rotate the shaft 30 through the worm and a worm gear arrangement and will drive the spindles 31 and 32 in opposite directions by properly twisting the belts 34. This form of the invention is advantageous in that the bristles of the brush elements may be continuous along the length of the spindles, thus avoiding a space in the center thereof within which a driving means is located like that shown in Figs. 2 and 5.

The modified form shown in Fig. 7 is similar to that illustrated in Fig. 6 in providing the shaft 4 with the worm section 28 which drives the spindle 30 through the worm gear 29. Instead of using small belts 34, however, the end of each brush spindle is provided with a disc 36 adapted to be driven through a friction contact with similar discs 37 on each end of the central spindle 30. Instead of discs, of course, it will be clear that gears could be used if so desired.

Another feature of the invention embodies a construction which will longitudinally reciprocate the brush elements during rotation thereof, thus imparting a massaging effect to the gums while the teeth are being cleaned. While the specific means by which this action may be accomplished may be varied, one very simple arrangement is to provide one end of each of the spindles 14 and 15 with an axially extending offset portion 38. This portion is adapted to cooperate with an inwardly extending projection 39 formed integrally with or otherwise suitably secured to one of the connecting sides 7 or 8. In Fig. 3 these projections are shown as being integral with the side 8. The length of each spindle is such as to permit a longitudinal sliding movement thereof between the sides, and one of the ends 17 of the yieldable support 18 may be so formed as to have a greater tension than the other end so as to normally urge the spindle toward the opposite side and thus maintain contact between the projection 39 and the corresponding end of the spindle. The two projections 38 and 39 will then have a camming effect as the spindle rotates to thus produce a reciprocation of the spindles and the brush elements connected thereto. It will be evident that any other suitable yieldable means can be utilized for urging the spindle into contact with the projection 39, such as coiled or leaf springs, without in any way departing from the spirit of the invention.

Referring now to the form of the invention disclosed in Figs. 9, 10 and 11, I have utilized four brush elements instead of the two described above. The four brush elements are located in pairs, one above the other, so that a simultaneous cleaning of the upper and lower teeth may take place. The shaft 4 may be similar except that its outer end will have both upwardly and downwardly extending end portions 40 and 41, spaced inwardly from which are similar ends 42 and 43. The sides 44 and 45 extend on both sides of the handle in order to support the four spindles 46, 47, 48 and 49 of the brush elements. If the driving mechanism to be used is like that shown in Fig. 1, it may be duplicated on the lower side by providing similar worm gears 50 and 51 adapted to be in mesh with the underside of the worm sections and with suitable gear or wheel means on the spindles 48 and 49. The brush elements may be formed either like those in Fig. 3 or similar to those in Fig. 4, or they may take any other suitable shape as long as the cleaning properties thereof are not impaired.

The supporting means for the spindles may be similar except these yieldable means as indicated by the numerals 52 and 53 will preferably extend inwardly toward each other at the center thereof and then be return bent as indicated by the numerals 54 and 55 to provide duplicate arrangements at the top and bottom. When it is desired to remove one of the brush elements, this type of supporting means may have one end thereof removed and the brush element may be lifted out in the manner shown in Fig. 11. This is, of course, true with all forms of the invention when this type of supporting means is used.

From the foregoing description it will be evident that I have provided a novel improvement in the art of rotary toothbrushes wherein a plurality of rotatable brush elements are utilized for the simultaneous cleaning of the front and back of the teeth as well as for the simultaneous cleaning of the upper and lower teeth. Novel driving means have been provided for rotating the brushes in pairs in opposite directions so that

the teeth may be properly cleaned by moving the brushes in a brushing motion away from the gums. The feature of reciprocating the brushes during cleaning for purposes of massaging the gums is a novel improvement which aids in more thorough cleaning and the obtaining of healthier teeth and gums.

It may be clear that the invention may take other specific forms than those disclosed herein such as the shape of the brushes, the driving means, the reciprocating means, and the removability of the brush elements without departing from the spirit of the invention or sacrificing any of the attendant advantages thereof, provided, however, that such changes fall within the scope of the claims appended hereto.

Having thus described my invention what I claim as new and desire to secure by Letters Patent of the United States is:

1. A rotary toothbrush of the character described, comprising a handle portion, brush supporting means on said handle portion, a pair of elongated brush elements rotatably mounted on said brush supporting means in substantially parallel and spaced relation to receive the teeth of a user therebetween, a lip guard extending longitudinally of and between said brush elements and including a plurality of teeth spaced apart along the length of said brush elements, and means for simultaneously rotating said brush elements toward each other.

2. A rotary toothbrush of the character described comprising a handle portion, brush supporting means on said handle portion, a pair of elongated brush elements rotatably mounted on said brush supporting means and extending transversely thereof in substantially parallel and spaced relation to receive the teeth of a user therebetween, a lip guard extending longitudinally of and between said brush elements and including a plurality of teeth spaced apart along the length of said brush elements, and means for simultaneously rotating said brush elements toward each other.

3. A rotary toothbrush of the character described, comprising a handle portion, brush supporting means on said handle portion, a pair of elongated brush elements rotatably mounted on said supporting means in substantially parallel and spaced relation to receive the teeth of a user therebetween, a lip guard extending longitudinally of and between said brush elements and including a plurality of relatively thin wall members spaced apart along the length of said brush elements and extending outwardly from the handle therebetween to prevent the lip of a user from being drawn inwardly between said brush elements, and means for rotating said brush elements simultaneously toward each other.

4. A rotary toothbrush of the character described, comprising a handle portion, brush supporting means on said handle portion, a pair of elongated brush elements rotatably mounted on said supporting means and extending transversely thereof in substantially parallel and spaced relation to receive the teeth of a user therebetween, a lip guard extending longitudinally of and between said brush elements and including a plurality of relatively thin wall members spaced apart along the length of said brush elements and extending outwardly from the handle thereby to prevent the lip of a user from being drawn inwardly between said brush

elements, and means for rotating said brush elements simultaneously toward each other.

5. A rotary toothbrush of the character described, comprising a handle portion, brush supporting means on said handle portion, a pair of elongated brush elements rotatably mounted on said supporting means in substantially parallel and spaced relation to receive the teeth of a user therebetween, a partition extending longitudinally of and between said brush elements, a lip guard including a plurality of teeth spaced apart along the length of said partition and positioned along each edge thereof, and means for simultaneously rotating said brush elements toward each other.

6. A rotary toothbrush of the character described, comprising a handle portion, brush supporting means on said handle portion, a pair of elongated brush elements rotatably mounted on said supporting means and extending transversely thereof in substantially parallel and spaced relation to receive the teeth of a user therebetween, a partition extending longitudinally of and between said brush elements, a lip guard including a plurality of teeth spaced apart along the length of said partition and positioned along each edge thereof, and means for simultaneously rotating said brush elements toward each other.

7. A rotary toothbrush of the character described, comprising a handle portion, brush supporting means on said handle portion, a pair of elongated brush elements rotatably mounted on said brush supporting means in substantially parallel and spaced relation to receive the teeth of a user therebetween, a lip guard extending longitudinally of and between said brush elements and including a plurality of members spaced apart along the length of said brush elements and extending between the bristles thereon, and means for simultaneously rotating said brush elements toward each other.

DONALD P. GROVER.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
474,345	Johansson	May 3, 1892
952,592	Villani	Mar. 22, 1910
1,007,888	Parker	Nov. 7, 1911
1,254,532	Paul	Jan. 22, 1918
1,430,967	Fendrich	Oct. 3, 1922
1,529,691	Davis	Mar. 17, 1925
1,555,522	Shapiro	Sept. 29, 1925
1,577,751	Paschall	Mar. 23, 1926
1,578,495	Zave	Mar. 30, 1926
1,795,098	Scadding	Mar. 3, 1931
1,822,631	Roig	Sept. 8, 1931
1,901,503	Fessenden	Mar. 14, 1933
1,927,566	Hawk	Sept. 19, 1933
2,044,344	Bagnall	June 16, 1936
2,052,656	Prien	Sept. 1, 1936
2,215,031	Elmore	Sept. 17, 1940
2,281,131	Wright	Apr. 28, 1942
2,285,865	Lowe et al.	June 9, 1942
2,435,421	Blair	Feb. 3, 1948

FOREIGN PATENTS

Number	Country	Date
327,553	Italy	July 16, 1935
442,749	Great Britain	Feb. 14, 1936
555,259	France	Mar. 19, 1923
676,771	France	Nov. 29, 1929